ENERGY SAVINGS OPPORTUNITY SURVEY
FORT A. P. HILL, VIRGINIA

A/E CONTRACT NO.
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VOLUME I
EXECUTIVE SUMMARY

Prepared for

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT CORPS OF ENGINEERS
BALTIMORE, MARYLAND

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1.0 INTRODUCTION

The purpose of this study is to analyze existing physical structures and infrastructure at Fort A. P. Hill in order to develop feasible energy conservation projects. An Energy Engineering Analysis (EEA) study was initially performed in 1985 by MMM Design Group at Fort A. P. Hill. This study recommended Energy Conservation Opportunities (ECO's) for saving energy and implementation under the Energy Conservation Investment Program (ECIP). Since the completion of the study in 1985, a number of buildings have been demolished, and some new buildings have been constructed. In addition, a number of buildings have been renovated. The goals of this current project are to update the original study by revising the energy and construction cost for the ECO's which have not been implemented since the completion of the original study, evaluating new buildings built since the completion of the original study for energy conservation and to analyze an energy conservation opportunity to provide automatic controls where heat pumps have been installed since 1985.

The ECIP analysis is a military construction funded program for energy conservation retrofit of existing facilities. Projects developed in this study will be documented in accordance with the program procedures established by the latest ECIP guidelines. Because of the uniqueness of the current study to analyze old, new and retrofitted buildings, this engineering analysis has been organized in three separate sections. The results of these calculations are then combined together to prepare ECIP documentation.

The study submitted by MMM Design group was based on performing computer simulation of select ECO's for eleven sample buildings. These eleven "sample" buildings are representative of all the buildings at the installation considered under the MMM Design Group's study. The scope of work for this study assumes that the computer calculations performed by MMM Design Group for energy usage are accurate and recalculations would not be required. However, if the original ECO's have been implemented in some of the buildings and some of the buildings have been demolished or if the technology has overtaken the original recommendation, the calculations would be adjusted.

Another factor prompting the updating of the original study is Executive order 12759-Federal Energy Management. This document requires all federal buildings to reduce their energy consumption by 20% (of the 1985 level) by the year 2000. Fort A.P. Hill will be on it's way to achieving this goal by the implementation of the recommended energy conservation opportunities in this study.

The study is seperated into three volumes, Volume I contains the Executive Summary, Volume II contains the Engineering Study and Volume III contains the Appendices.

Significant assistance and cooperation has been provided by the Corps of Engineers and Fort A.P. Hill staff for this analysis. EAC wishes to extend special appreciation to Mr. James Hawk, Project Manager, Baltimore District Corps of Engineers, Ms. Terry Banks, Energy Coordinator, Fort A.P. Hill, and Mr. Anthony Battaglia, Mobile District Corps of Engineers, for their guidance which has contributed to the development of this study.

2.0 PROJECT SUMMARY

The intent of this study is to evaluate and update cost estimates and calculations as necessary in the study prepared by MMM Design Group in 1985, evaluate new buildings built since the completion of the original study, and evaluate an energy conservation opportunity to provide automatic controls for heat pumps.

The original study by MMM Design Group analyzed twenty Energy Conservation Opportunities (ECO) to save energy at Fort A.P. Hill. Eight of these twenty ECO's were recommended for implementation under ECIP. As a result of updating the original study, only the following seven ECO's are being recommended for ECIP implementation under the current study:

- Night Setback
- Replace Standard Fluorescent Lighting with High Efficiency Type
- Replace Inefficient Light Fixtures
- Water Heater Insulation
- Ceiling Insulation
- Photocell Lighting Controls
- Domestic Hot Water Circulating Pump Controls

Several factors have changed since the previous study was completed. The energy cost for electricity has increased and the cost for oil and LP gas has decreased. The electricity cost has increased from about $4.25 per MBtu in 1979 to $20.67/MBtu in 1994. The construction cost for the various ECO's has increased and the ECIP criteria has also changed. These factors when combined together are resulting in longer payback periods for the original ECO's and lower Savings to Investment Ratio's (SIR), making some of the original ECO's unattractive.

The new buildings at the installation consist of structures built after the completion of the original study in 1985. Ninety six new buildings have been constructed since the completion of the original study. Fifteen potential ECO's were considered for the new buildings (See

Section 4.0- Energy Conservation Analysis) for a detailed listing. The energy conservation opportunities consist of retrofitting hot water systems, Heating, Ventilation, and Air Conditioning (HVAC) systems, and lighting systems. Of the fifteen ECO's considered for the new buildings, the following seven ECO's are recommended for implementation under ECIP:

- Low Flow Shower Heads
- Replace Incandescent Lighting with Compact Fluorescent Lighting
- Occupancy Sensors
- Energy Saving Fluorescent Lamps
- Shut Down Energy To Hot Water Heaters
- Replace Exit Signs
- Replace Inefficient Fluorescent Fixtures w/ Energy Efficient Fluorescent Fixtures, Ballast and Lamps

In addition to updating the original study and evaluation of the new buildings, an energy conservation opportunity has been studied to install new controls on heat pump systems to reduce the use of the electric resistance heater during periods of cool weather and morning warm up. These controls have been evaluated for both new and existing buildings. This ECO would save approximately 2,677 Mbtu/yr in electricity usage and has an SIR (Savings to Investment Ratio) of 8.39.

The implementation of these ECO's would save approximately 16,099 MBtu/yr. This represents 22% of the total energy consumption and $210,818 per year in energy cost savings at Fort A. P. Hill. The overall SIR for the project is 5.05 with a simple payback period of 2.35 years.

3.0 DESCRIPTION OF THE FACILITY

Fort A. P. Hill is a semiactive sub-installation of Fort Meade, Maryland under the jurisdiction of the U.S. FORCES Command. The training reservation is located in Caroline County, Virginia, approximately 20 miles southeast of Fredericksburg and 40 miles north of Richmond. Situated just east of the fall line between the Piedmont and Coastal Plain regions of Virginia, Fort A. P. Hill encompasses approximately 120 square miles of moderately rolling woodland and open training areas.

3.1 Mission; Past, Present and Future

Land area for A. P. Hill Military Reservation was purchased by the Federal Government in 1940 and 1941. Originally acquired as a maneuver area for infantry training, the reservation housed up to 28,000 troops during the first part of World War II.

Toward the end of the war, troop strength dropped but the variety of training increased to include infantry, artillery, medical, engineer, calvary and signal units. For two decades following World War II, activity at A. P. Hill fluctuated greatly, depending on the Army's needs for temporary training facilities. During that period, A.P. Hill's designation changed from Military Reservation to Camp, and finally to Fort A. P. Hill in 1974. Since the mid-1960's, improvements and facility expansions were made to include additional firing, artillery and engineer skills training. During the 1970's, utilization of Fort A. P. Hill increasingly shifted from the National Guard to the Active Army.

Present training at Fort A. P. Hill includes nonfiring battalion maneuvers, helicopter nap-of-the-earth flights, artillery and mortar firing, small arms firing, rocket firing, grenade firing, helicopter aerial gunnery, parachuting, night vision electro-optics and various infantry combat skills. Bridging, tactical rafting, field fortification and mine warfare are among the engineer training skills conducted at the facility.

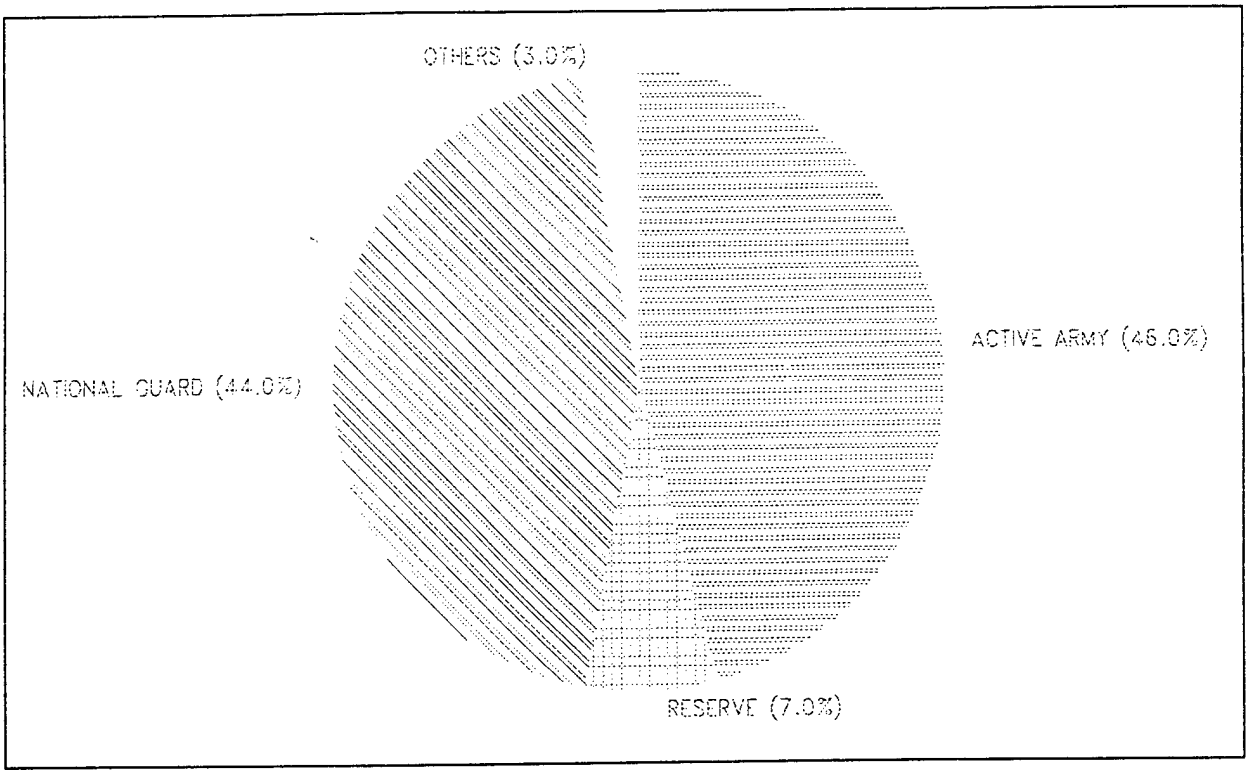
Users of Fort A. P. Hill's various ranges and maneuver areas include weekend and annual Reserve components and the Army National Guard. The Fort is also utilized throughout the year by the Active Army, and other DOD agencies. Figure 3-1 identifies the proportionate utilization of training facilities. Full-time users include the following:

A. U.S. Army Communications Command Element.
B. U.S. Army Health Clinic.
C. Troop B, 158th Armored Cavalry.
D. 80th Division Maneuver Training Command.
E. 3rd Infantry.
F. Night Vision Electro-Optics Laboratory.
G. Seal Team Two, U.S. Navy.
H. 756th Tactical Airlift Squadron.

In the future, Fort A. P. Hill is expected to remain the diversified training facility that it presently is. Research and development facilities such as the Night Vision Laboratory, the Mobility Equipment Research Center and Laser Test Facility have been constructed in the last eight years. Fort A.P. Hill is expected to remain a vital Reserve and National Guard training ground. The future mission also involves provisions for emergency expansion in the event of military mobility for a national or local emergency.

3.2 Population/Occupancy

The permanent population at Fort A.P. Hill is relatively small. It consists of approximately 200 full-time military and civilian personnel. The permanent staff is augmented by roughly an equal number of temporary employees from April through September.



1990 TRAINING UTILIZATION - MANDAYS

FORT A. P. HILL

REFERENCE: INSTALLATION UTILIZATION SUMMARY

FIGURE 3-1

Seasonal training utilization at Fort A. P. Hill accounts for more than 90% of the annual population. During the seasonal training, there is an average of about 4300 trainees at any one time. The following table for seasonal population shows the breakdown of part time training throughout the year.

SEASONAL POPULATION

Season	Period	Percent of Annual Total
Spring	(March-May)	36
Fall	(Sept.-Nov.)	28
Summer	(June-August)	24
Winter	(Dec.-Feb.)	12

3.3 Physical Characteristics

Rather than a consolidated built-up area, development at Fort A. P. Hill consists of a Post Headquarters area and 12 widely scattered camp sites. Of these sites, four are suitable for year-round occupancy and eight are used only for weekend or annual training exercises during the nonheating season.

3.3.1 Architectural Conditions

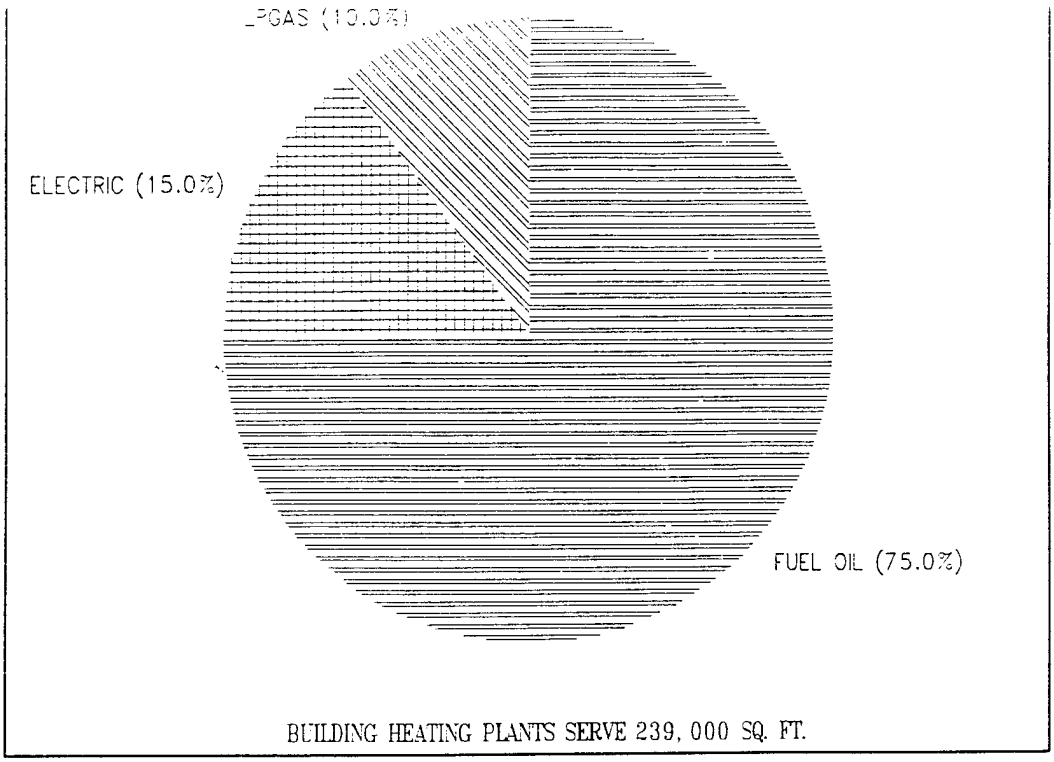
Of the 623 buildings making up approximately one million square feet at Fort A. P. Hill, most are temporary-type wood frame or lightweight metal frame structures constructed during World War II. The remaining buildings are permanent masonry block or brick structures. Most of these permanent buildings, however, are not equipped with heating systems and are used during nonheating months only. A large number of new structures were constructed more recently, some as recent as 1992.

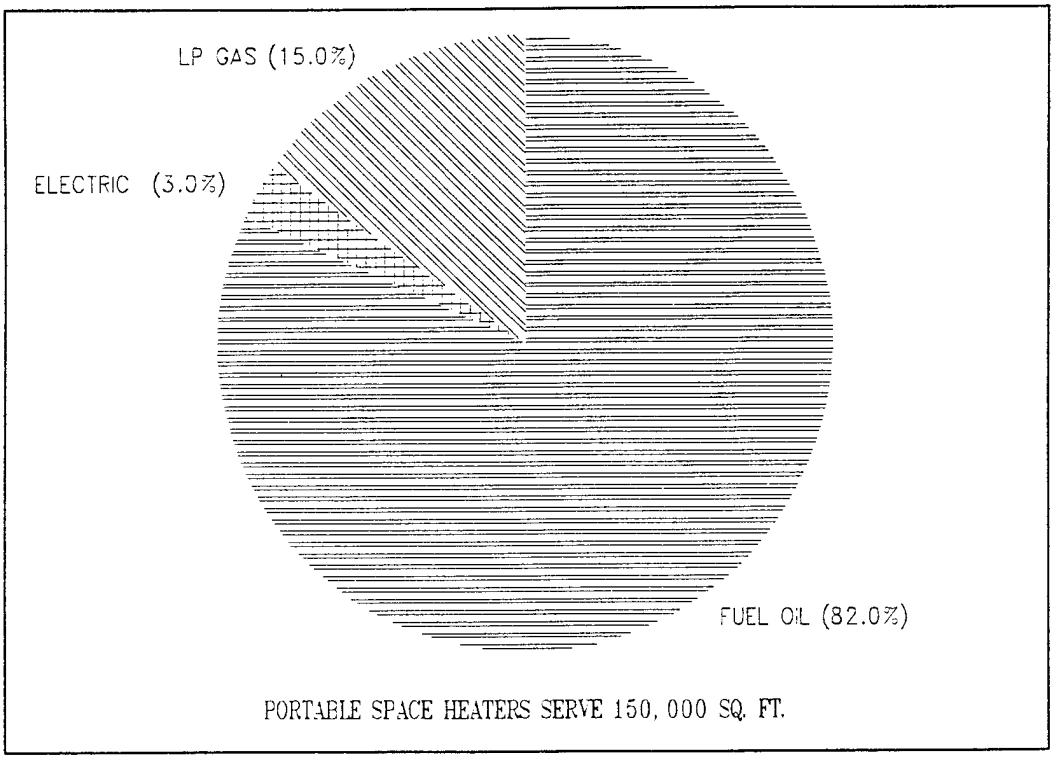
3.3.2 Mechanical Systems

Heating Systems: Of the heated buildings, about 60% have individual heating systems. These are generally oil-fired, warm air furnaces or individual boilers. Other buildings are heated by semi-portable space heaters. Space heaters primarily consume fuel oils, especially #1 Oil (kerosene).

Heating/Cooling Systems: The majority of the office spaces are heated and cooled by heat pump systems. Most buildings have pad-mounted packaged air to air heat pump systems. Newly constructed housing and office facilities also have these systems. Spot cooling is provided by small window-mounted air conditioners. There are no central (district) chilled water systems at Fort A.P. Hill. The only chilled water systems are local and support the needs of structures on an individual basis. Refer to Figures 3-2 and 3-3 on the pages 9 and 10 for the distribution of heating and cooling system types. Percentages have been determined on a square-foot basis.

Ventilation: About 65% of the building area is cooled by mechanical ventilation, primarily power roof ventilators. Remaining buildings have gravity-relief venting.



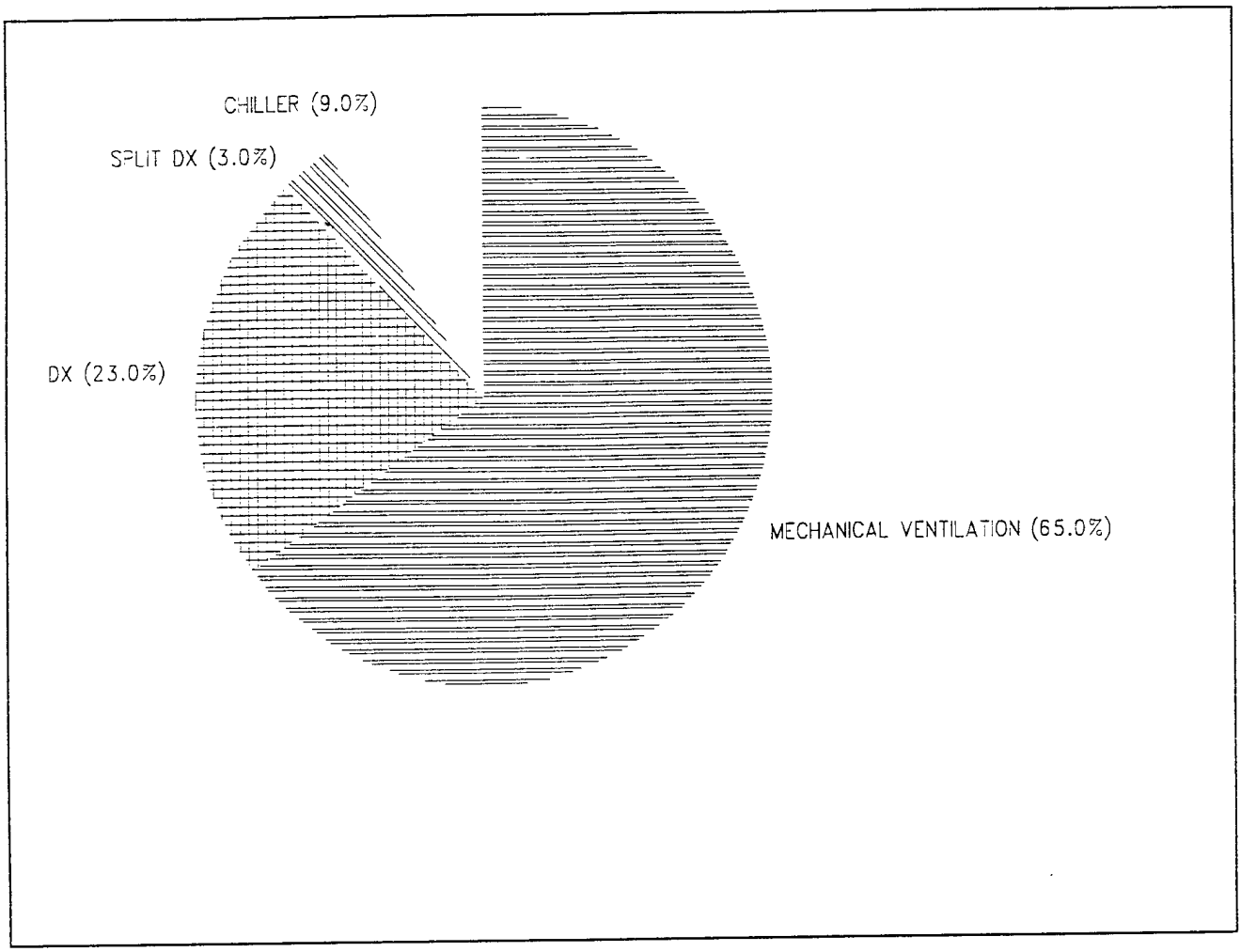


HEATING SYSTEM FUEL SOURCE SUMMARY

FORT A. P. HILL

Reference 1 Building Information Schedule 1992

FIGURE 3-2



COOLING SYSTEM SUMMARY- FORT A. P. HILL

143,000 FT^2 (15% Of Total Building Ft^2)

REFERENCE: BUILDING INFORMATION SCHEDULE, FY92

FIGURE 3-3

Domestic Hot Water: Most systems consist of individual electric resistance tank-type water heaters. Larger units, found in barracks and mess halls, are generally oil or LP gas-fired, tank type. A small number of buildings provide hot water by heat exchange from the building heating boilers.

3.3.3 Electrical Systems

Approximately two-thirds of the building are illuminated with fluorescent lighting, and one-third with incandescent lighting. Fixtures in older buildings are typically surface-ceiling mounted or suspended, and recessed in the new buildings. Lighting controls are manual, consisting of a combination of circuit breakers and toggle switches. "Standard" 40 watt fluorescent lamps are primarily used, however, "Energy-Saver" type lamps are in use in a few buildings.

Exterior lighting for the buildings is limited to incandescent type at building entries and security floodlights and high-intensity discharge for maintenance area aprons and parking lots. Controls are primarily manual type and in some cases photocell type.

Street lighting is approximately an equal mixture of low pressure sodium and mercury vapor. Mercury vapor is used in the older areas and low pressure sodium in the newer developments. All existing street lighting utilizes photocell controls.

Recreational area lighting in tennis courts, ball fields, etc., is incandescent or quartz fixtures which are manually controlled.

Electric power is furnished by the Rappahanock Electric Cooperative (REC). The distribution system is mainly overhead, rated at 12.5/7.2 kv three-phase, four-wire, 60 Hz. Other utility systems at the installation consume electricity include potable water supply and sewage treatment plants. Currently, Fort A. P. Hill relies solely on ground water with twenty five wells located throughout the facility as the source of potable water. The facility operates four sewage treatment plants. Electric motor-driven pumps are used for water distribution and the operation of the sewage treatment plants.

3.3.4 Building System Winterization

The Facility Engineering Office manages a continuing annual winterization procedure which affects approximately eighty two buildings or 400,000 square feet. All power is cut off to the buildings involved and provisions are made to prevent freezing of plumbing piping, fixtures and waste lines. The process is implemented in October and November; dewinterization occurs as necessary based on anticipated building occupancy, usually not later than April 1. In some buildings, dewinterization is implemented earlier in the heating season (January or February) due to specific training needs. Handled by the post work force, this process has been similarly conducted on an annual basis for the past several years.

4.0 ENERGY CONSERVATION ANALYSIS

4.1 ECO's Investigated (Original Study)

The following energy conservation opportunities (ECO's) were analyzed for implementation under the original ESOS study completed by MMM Design Group. As per the scope of work for this study, these ECO's were reevaluated by updating energy and construction costs under the current study. Additional ECO's are listed under paragraph 6.0 Maintenance and Repair for implementation by facility maintenance staff. ECIP Economic Analysis Summary sheets for these ECO's and complete back-up calculations are included in Appendix D. The following ECO'S were re-evaluated for implementation under ECIP:

- Night Setback
- Replace Inefficient Light Fixtures
- Ceiling Insulation
- Wall Insulation (Wood Frame Walls)
- Wall Insulation (CMU Walls)
- Caulking and Weatherstripping
- Storm Windows
- Replace Inefficient Site Lighting
- Replace Over Head Door
- Timer Switches (Occupancy Sensors)
- Water Heater Controls
- Solar Domestic Water Heater
- Trombe Wall Retrofit
- Photocell Lighting Controls
- Replace Fluorescent Lamps With High Efficiency Types
- Domestic Hot Water Circulating Pump Controls
- Insulate Domestic Hot Water Heaters

4.2 ECO's Investigated (Current Study)

As part of the on going energy conservation efforts at Fort A.P. Hill buildings built after the completion of the MMM Design Group study in 1985 were analyzed for possible Energy Conservation Opportunities (ECO's). After conducting field surveys and discussions with facility personnel the following ECO's were computer simulated under this study to calculate energy savings and costs.

- Shut down energy to hot water heaters or modify controls
- Low Flow Shower Heads (2 to 3 GPM)
- Instantaneous Hot Water Heaters
- Economizer Cycle
- Occupancy Sensors to Control Lighting
- Photocells to Control Indoor Lighting Near Windows
- Replace Incandescent Lamps With Compact Fluorescent Lamps
- Replace Incandescent Exit Sign Fixtures with LED (Light Emitting Diode) Fixtures
- Replace Standard Fluorescent Lamps With Energy Conserving Lamps
- Replace Fluorescent Fixtures With New Fixtures With Energy Efficient Ballasts and Energy Saver Lamps
- Automatic Controls for Heat Pumps

4.3 ECO's Recommended

Table 1.0 - LIST OF ECO'S RECOMMENDED FOR IMPLEMENTATION shows the applicable ECO's and their energy and dollar savings, construction costs, and SIR's. There are a total of thirteen ECO's which when combined into one project would qualify for funding under current ECIP criteria. These ECO's have been selected as a result of updating the original study buildings, study of the structures built since 1985 and evaluation of automatic controls for heat pumps.

4.4 Non-Applicable ECO's

The following ECO's were considered for possible implementation. However, after further discussions with utilities and installation personnel they are either currently being studied or not applicable to the buildings being analyzed.

- FM Radio Controls

FM radio controls are used to reduce the electrical load at the installation. When periods of electrical energy usage becomes high, condensing units could be remotely turned off to reduce electrical energy consumption and peak demands. This ECO has not been studied because the local utility company is in the process of performing the analysis. The utility company currently controls the water heaters with a similar system. The utility company expects to have a program implemented at Fort A. P. Hill for air conditioning systems with in approximately two years at no cost to the government.

- Chiller Controls

Installation of a system of sensors and controllers that will allow resetting of chilled water supply temperature as high as possible without the loss of proper dehumidification has not been studied because none of the buildings being studied have central chillers.

- Insulate Pipes and Ducts

Heating and domestic hot water pipes and supply air ducts should be insulated to reduce heat loss and gain. For new construction this ECO is feasible, however, when pipes and ducts are concealed in walls, it is not feasible.

- Remove Lamps and Fixtures

In areas where the lighting levels exceed Army COE and AEI requirements, existing four lamp fluorescent fixtures could be changed to two lamp fixtures by removing two interior lamps or in areas where the lighting level is so intense, selected fixtures could be removed. Lighting surveys show that

the existing lighting levels in the study buildings are near or below the recommended light levels for the area.

TABLE 1.0 - LIST OF ECO'S RECOMMENDED FOR IMPLEMENTATION

ECO	DESCRIPTION	COST (incl. SIOH) $	FIRST YEAR ANNUAL SAVING$	ENERGY SAVINGS MBTU/YEAR			SIR	SIMPLE PAY-BACK PERIOD YEAR	ANA-LYSIS DATE	PRO-GRAM YEAR	PROG-RAM YEAR COST
				ELEC	OIL	TOTAL					
	Low Flow Shower Heads	3,490	9,364	453		453	39.31	0.37	1994	1995	3,490
	Replace Incandescent Lighting with Compact Fluorescent	10,957	13,890	672	-	672	15.77	0.74	1994	1995	10,957
	Night Set Back	41,959	47,437	768.7	5,544.5	6313.2	14.3	0.93	1994	1995	41,959
	Automatic Controls for Heat pumps	53,319	55,334	2,677	-	2677	8.39	1.00	1994	1995	53,314
	Photocell Lighting Controls	757	436	21.1	-	21.1	6.78	1.74	1994	1995	757
	Replace Standard Fluorescent Lamps With High Efficiency Types	19,513	9,767	493.1	-74.8	418.3	5.85	2.00	1994	1995	19,513
	Occupancy Sensors	33,094	16,433	795	-	795	5.84	2.01	1994	1995	33,094
	Energy Saving Fluorescent Lamps	16,351	6,139	2,97.0	-	297	4.42	2.66	1994	1995	16,351
	Shut Down Energy to Hot Water Heaters	1,012	269	13		13	3.89	3.77	1994	1995	1,012
	Domestic Hot Water Circulating Pump Controls	265	58	2.8	-	2.8	3.2	4.59	1994	1995	265
	Replace Inefficient Light Fixtures	124,499	29,360	1,420		1420	2.98	3.94	1994	1995	124,499
	Water Heater Insulation	29,843	5,505	175.6	329.7	505.1	2.89	5.42	1994	1995	29,843
	Replace Exit Sign	5,566	641	31		31	2.26	5.08	1994	1995	5,566
	Replace Exist. Fluor. Fixt. w/Energy Eff. Fixt.	16,627	2,646	128	-	128	1.87	6.28	1994	1995	16,627
	Ceiling Insulation	139,553	13,541	10.7	2,340	2350.7	1.71	10.00	1994	1995	139,553
	Totals	495,784	210,818	7,958	8,140	16,099	5.05	2.35	1994	1995	495,784

5.0 ENERGY AND COST SAVINGS

The following TABLE 2.0, presents the estimated energy usage patterns and energy costs before and after the implementation of the recommended ECO's

TABLE 2.0 - ENERGY SAVINGS

	Existing Energy and Energy Cost	Energy Use and Cost After Implementation of ECO's	Savings After Implementation	
			%	Savings
Site Energy Consumption				
Electricity (MBtu)	31,453	23,495	25.3	7,958
LP Gas (MBtu)	4,382	4,382	0	0
Distillate Oil (MBtu)	40,930	32,790	19.9	8,140
Kerosene (MBtu)	1,361	1,361	0	0
Total MBtu	78,126	62,027	20.6	16,099
Energy Costs Per/year ($)	948,051	737,233	22.2	210,818

Implementing the recommended ECO's could potentially reduce the overall energy costs at the installation by 22%. This percentage corresponds to a savings of $210,818 per year at the current energy usage levels.

The existing energy usage figures are averages based on utility bills for the installation for years 1989 through 1992. The energy costs are taken from the costs on the ECIP Analysis sheets used in this study.

6.0 MAINTENANCE & REPAIR

The following ECO's are recommended for implementation by the Facility Maintenance Staff on buildings as applicable. Some ECO's pertain to an entire building while others are based on per square foot of building area. Table 3.0- LIST OF MAINTENANCE ITEMS on page 22 is a summary of the calculated life cycle cost analysis for the maintenance items listed in this report. Implementing the following ECO's on an as needed basis will further reduce the energy consumption at Fort A.P. Hill and help meet the energy savings targets for the federal buildings.

High-Efficiency Type Motors

This ECO considers that standard type motors be replaced by high efficiency type motors as they need replacement. The study was based on the difference in the cost of a high efficiency type motor versus the cost of a standard motor. This ECO is based on an as needed basis replacement and is left up to the maintenance staff for implementation. When a motor fails, an energy efficient motor should be installed in its place.

Insulated Louver Panels

This ECO considers the installation of tight fitting, insulated panels over exhaust of fresh air louvers and dampers when fans are off during the heating season. Calculations have been made on a "per panel" basis. The panels should be installed where applicable.

Reduce Window Glazing

This ECO considers the reduction of window glazing in buildings where windows are not needed as fire exits or for natural light and ventilation. The covering of windows with insulated plywood panels will reduce the infiltration of outside air and will reduce heat transfer through the window area. Greater energy savings could be obtained by installing exterior siding over the panels. This would improve the heat transfer coefficient and would help retain the appearance of the building. This ECO

should be implemented "as applicable", as determined by the Facility Engineer. Coordination with current and programmed utilization of involved buildings is critical. Based on experience, it is recommended that windows on the south, south-east and south-west building elevations should not be covered, due to the solar heat gain and natural lighting obtained through these windows. Analysis is based on a 4'0" x 3'0" window.

Replace Overhead Door (on an as needed basis)

The replacement of overhead doors has been studied in detail for the entire installation. However, the high cost of new insulated doors resulted in a long payback. If implemented, as the doors need replacement, the ECO proves more cost effective. The energy savings from this ECO are achieved by replacing worn, wood overhead doors, which are poorly sealed, with new weatherstripped, insulated doors. The implementation of this ECO is left to the discretion of the Facility Engineer, as existing doors become worn or damaged. For this reason the analysis has been made on a "per door" basis.

TABLE 3.0 - LIST OF MAINTENANCE ITEMS

ECO	DESCRIPTION	COST (incl. SIOH) $	FIRST YEAR ANNUAL SAVING$	ENERGY SAVINGS MBTU/YEAR ELEC	OIL	TOTAL	SIR	SIMPLE PAY-BACK PERIOD YEAR	ANA-LYSIS DATE	PRO-GRAM YEAR	PROG-RAM YEAR COST
High Efficiency Type Motors (Each motor)		449	85	4.1	-	4.1	16.22	5.30	1994	1995	449
Insulated Damper Panels		32	14	-	2.4	2.4	5.49	2.37	1994	1995	32
Reduce Window Glazing (4'x 3' window)		38	9		1.16	1.6	4.25	4.16	1994	1995	38
Replace Overhead Doors (as needed basis)		4,404	694	-	122.0	122.0	2.79	6.34	1994	1995	4,404

7.0 ENERGY PLAN

Energy Conservation Investment Program (ECIP) is available for implementation of the recommended ECO's. This program is for projects which have a construction cost estimate greater than $300,000, a savings to investment ratio (SIR) greater than 1.25 and a simple payback period of 10 years or less. ECIP projects are also assessed a level of risk associated with the continuity of the base mission and stability of the baseline energy consumption used in the analysis calculations.

The services provided by Fort A.P. Hill are expected to be required throughout the foreseeable long term. Accordingly, it is also expected that the energy baseline used in the preparation of this analysis will remain stable for the period of the savings calculations.

The following ECO's are recommended for implementation through ECIP:

ECO	Cost Incl. (SIOH) $	Energy Savings MBTU/Yr	Program Year
Low Flow Shower Heads	3,490	453	1995
Replace Incandescent Lighting with Compact Fluorescent	10,957	672	1995
Night Set Back	41,959	6,313.2	1995
Automatic Controls for Heat Pumps	53,319	2,677	1995
Photocell Lighting Controls	757	21.1	1995
Replace Standard Fluorescent Lamps with High Efficiency Types	19,513	418.3	1995
Occupancy Sensors	33,094	795	1995
Energy Saving Fluorescent Lamps	16,351	297	1995

ECO	Cost Incl. (SIOH) $	Energy MBTU/Yr	Program Year
Shut Down Energy to Hot Water Heaters	1,012	13	1995
Domestic Hot Water Circulating Pump Controls	265	2.8	1995
Replace Inefficient Light Fixtures	124,499	1,420	1995
Water Heater Insulation	29,843	505.1	1995
Replace Exit Signs	5,566	641	1995
Replace Exist. Fluorescent Fixtures with Energy Efficient Fixtures	16,627	128	1995
Ceiling Insulation	139,553	2,350.7	1995
TOTALS	495,784	16,099	1995